

DIVERSITY OF SPIDERS AROUND SIRPUR LAKE, INDORE (M. P.), INDIA

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ABSTRACT

This study describes the diversity of spiders around Sirpur lake ($22^{\circ} 41' 52''\text{N} - 75^{\circ} 48' 45''\text{E}$) located in the outskirts of about 6-8 km away from Indore city. This survey was carried out during 2013 to 2014 using three sampling techniques (Active visual searching, Sweep netting, Vegetation beating). A total of 58 species of spiders belonging to 38 genera under 17 families viz., Araneidae, Clubionidae, Erisidae, Gnaphosidae, Hersiliidae, Lycosidae, Mitrogidae, Oxyopidae, Pisuridae, Philodromidae, Salticidae, Scytodidae, Sparssidae, Therididae, Thomisidae, Tetragnathidae, Uloboridae, were recorded. Among these families most dominated family was Araneidae. This Family represented by 8 genera and 23 species. The second largest family was Salticidae, represented by 10 genera & 13 species. Abundance of Araneidae may be due to greater availability of prey due to better humidity and occurrence of high number of Salticidae is because it is cosmopolitan present everywhere in abundance. The survey result shows that the study area is rich in spider diversity.

KEYWORDS: Araneid, Spider, Diversity, Jumping Spider, Orb Weaver, Indore

INTRODUCTION

Spiders belong to the order Araneae of class Arachnida. Fossil records of spiders dates back to the Devonian period some 380 million years ago (Shear *et al.*, 1989). Spiders are among the most diverse group and are currently ranked seventh in the global diversity after the five largest orders Coleoptera, Hymenoptera, Lepidoptera, Diptera, and Hemiptera (Coddington and Levi, 1991). Spiders find their distribution in almost all conceivable habitats including caves, snow-covered tundra, high mountains and intertidal zones in all continents, except Antarctica (Foelix, 1996; Joque, R. and Dippenaar-Schoeman, 2006). The diversity of spider is very high everywhere. There are about 43,678 described species throughout the world. As many as 1521 species are reported from India, out of total of species reported from world, which is very less. Shedding light on to these lesser known groups is important because all of the larger groups, including ourselves, depend on these smaller organism for some part of their daily natural history.

Spiders play a very important role, being a dominant predator of insects, pests and other organisms; they are helpful in maintaining the dynamic interaction of the ecological units in a micro level food web and can serve as an essential element in Integrated Pest Management processes and helpful in reducing the ill effects of overdoses of pesticides and other insecticides. Spiders being ecologically important, they are economically beneficial too. Spider secretions like silk and venom are now very important industrial inputs especially in pharmaceutical industries. Therefore in order to protect spider populations we have to work for their conservation, and meaningful conservation cannot take place if the species involved are not known. Hence a faunistic survey was planned to document the spider diversity from Sirpur lake Indore city.

The spiders of many families were practically unknown from Madhya Pradesh before Tikadar (1980, 1982) and Tikadar and Malohtra (1980) who described some species of the families Thomisidae, Philodromidae, Lycosidae, Araneidae and Gnaphosidae from Madhya Pradesh in fauna of India. Araneae volume 1 and 2 Tikadar and Gajbe (1976) described a few species of family Gnaphosidae from Madhya Pradesh. The spiders of Madhya Pradesh were studied in detail by Gajbe (1987-1999), who described many new species from this region. Gajbe (1992a) described the family Mimetidae and Platnick (1991) and Platnick and Gajbe (1994) recorded species of the family Cithaeronidae for the first time from Madhya Pradesh. Gajbe (1995a) recorded 13 species from Indravati Tiger Reserve, Chhattisgarh. Rane and Singh (1977) recorded five species from and Gajbe (1995b) 14 species from Kanha Tiger Reserve, Madhya Pradesh. In recent times, Gajbe (1999, 2000) have described 32 new species, Bhandari and Gajbe (2001) 10 new species, and Gajbe (2003) one new species of spiders from Jabalpur district, Madhya Pradesh. Gajbe (1999) also recorded many lynx spiders of the genera *Oxyopes* and *Peucetia* (family Oxyopidae) from Madhya Pradesh and further identified 25 new species from Madhya Pradesh, provisionally placed under the genera *Scytodes*, *Triaeris*, *Pholcus*, *Thomisus*, *Philodromus*, *Misumenoides*, *Runcinia*, *Tegenaria*, *Heteropoda*, *Phidippus*, *Rhene*, *Eucta*, *Tetragnatha* and *Dolomedes*, which will be described in detail, separately. On the basis of these species and some other species identified from Seoni district in detail in Madhya Pradesh, the families Oonopidae, Tetragnathidae, Heteropodidae, Pisauridae, Pholcidae and Dictynidae are also being reported from Madhya Pradesh.

METHODS AND MATERIAL

Study Site

Sirpur lake is on the outskirts (Dhar Road) of the city. It is about 6-8 km away from the Indore ($22^{\circ} 44' \text{ N}, 75^{\circ} 50' \text{ E}$) city. Field near the tank is lush green having wild variety of naturally occurring vegetation and fauna.



Figure 1: Satellite Photograph of Sirpur Lake Indore (M. P.), India

Survey of spider from different places of lake was carried out during 2013 to 2014. The three methods employed for collection of spider in our study are

Active Visual Search

Spiders both at the ground level and above ground, including in shrubs and low trees were searched for one hour period. In addition, searching was performed at all potential cryptic microhabitats, especially on the surface of plants, under rocks, barks, logs, leaves, branches, tree trunks and spaces in between, dry leaf litter and grass. The spiders were collected by hand picking in plastic vials.

Sweep-Netting

This method was employed in order to sample spiders mainly from grass layer with a sweep net of diameter 40 cm. The method was employed for one hour including the period for searching and bottling of spider. This method consisted of roaming through the grass-shrub layer and sweeping the net for a standard number of times (Coddington *et al.* 1996). Each sweeping event consisted of 05 sweeps, followed by emptying the content in an umbrella, collection and repeating the process for an hour (approximately 30 sweeps/hour).

Beating

Spiders from canopy layer above 5 feet height were collected using beating method. Beating consisted of tapping/striking the shrub and tree vegetation with a 1m long solid stick and catching the falling spiders in an inverted umbrella held beneath the vegetation. It is easy to transfer from the umbrella into the sample vial. An average of 20 beats (one slot of 05 beat) per tree were taken in a span of one hour.

Identification of Spiders

All adult specimens were preserved in 70% alcohol and identified up to family, genus and species level. Identification of spiders was carried out on the basis of morphometric characters of various body parts and the detail structure of epigyne of female and pedipalp of male spiders. A help of various keys and World Spider Catalogue (recent edition) and other relevant literatures from India and abroad was taken in to consideration for proper identification. Initially the book, "Spider families of the world" by Jocque and Dippenaar-Schoeman was referred every time to identify the family of the spider and then the published Indian literature (Books and Monographs) first and then research papers from India and outside India were referred to identify the genus and species. I used to go through World Spider Catalogue 14.5 (Platnick, 2014) was useful in knowing the synonyms and transfers before finalizing the name of spider.

RESULTS

A total of 58 species of spiders belonging to 38 genera under 17 families from different places around Sirpur lake were recorded. Various families were recorded are Aranidae, Clubionidae, Eresidae, Gnaphosidae, Hersillidae, Lycosidae, Miturgidae, Oxyopidae, Pholcidae, Philodromidae, Salticidae, S cytodidae, Sparassidae, Theridiidae, Thomisidae, Tetragnathidae, Uloboridae. Among these families most dominated family was Araneidae. This Family represented by 8 genera and 23 species.

4 species belonging to Theridiidae family, 2 species each of family Thomisidae, Oxyopidae, Lycosidae and one species each of families Clubionidae, Eresidae, Gnaphosidae, Hresillidae, Miturgidae, Sparassidae, Tetragnathidae, Philodromidae and Uloboridae.

DISCUSSIONS AND CONCLUSIONS

The spiders of Sirpur lake is rich in number and types of species represented by 58 species belonging to 37 genera under 17 families. 23 species belonging to Aranidae family followed by 13 species belonging to Salticidae family, 4 species belonging to Theridiidae family, 2 species each of family Thomisidae, Oxyopidae, Lycosidae and one species each of families Clubionidae, Eresidae, Gnaphosidae, Hresillidae, Miturgidae, Sparassidae, Tetragnathidae, Philodromidae and Uloboridae.

Table 1: List of Spiders Recorded from Sirpur Lake

Sr.No	1.Family:Araneidae
1.	<i>Argiope aemula</i> Walckenaer 1841 (Female)
2.	<i>Argiope anasuja</i> Thorell 1887 (Female)
3.	<i>Araneus mitificus</i> Simon 1886 (Female)
4.	<i>Cyclosa bifida</i> Doleschall 1859 (Female)
5.	<i>Cyclosa confragosa</i> Thorell 1892 (Female)
6.	<i>Cyclosa moonduensis</i> Tikader 1963 (Female)
7.	<i>Cyclosa moonduensis</i> (Male)
8.	<i>Cyclosa spirifera</i> Simon 1889 (Female)
9.	<i>Cyclosa spirifera</i> Simon 1889 (Male)
10.	<i>Cyrtophora cicatrosa</i> Stoliczka 1869 (Female)
11.	<i>Cyrtophora citricola</i> Forskal 1775 (Female)
12.	<i>Cyrtophora citricola</i> Forskal 1775 (male)
13.	<i>Eriovixia excelsa</i> Simon 1889 (Female)
14.	<i>Eriovixia excelsa</i> Simon 1889 (male)
15.	<i>Lipocrea epeiroides</i> (Female)
16.	<i>Lipocrea epeiroides</i> (male)
17.	<i>Neoscona nautica</i> L. Koch 1875 (Female)
18.	<i>Neoscona theisi</i> Walckenaer 1841 (Female)
19.	<i>Neoscona theisi</i> Walckenaer 1841 (Male)
20.	<i>Neoscona vigilans</i> Blackwall 1865 (Female)
21.	<i>Neoscona vigilans</i> Blackwall 1865 (Male)
22.	<i>Thelacantha brevispina</i> Doleschall 1857 (Female)
23.	<i>Thelacantha brevispina</i> Doleschall 1857 (Male)
	2.Family:Clubionidae
24.	<i>Clubiona drassodes</i> OP Cambridge 1847 (Female)
	3.Family:Eresidae
25.	<i>Stegodyphus sarasinorum</i> Karsch 1891 (Female)
	4.Family: Gnaphosidae
26.	<i>Gnaphosa</i> Sp. Latreille 1804(Male)
	5.Family:Hersiliidae
27.	<i>Hersilia savignyi</i> Lucas 1836 (Female)
	6.Family:Lycosidae
28.	<i>Hippasa agelenoides</i> Simon 1884 (Female)
29.	<i>Paradosa sumatrana</i> Thorell 1890 (Female)
	7.Family: Miturgidae
30.	<i>Chericanthium</i> C.L. Koch 1839 (Female)
	8.Family:Oxyopidae
31.	<i>Oxyopes birmanicus</i> Thorell 1887 (Female)
32.	<i>Peucetia viridescens</i> Hentz 1832 (Female)
	9.Family:Pholcidae
33.	<i>Crossopriza lyoni</i> Blackwall 1867 (Female)
34.	<i>Pholcus phalangoides</i> Fuesslin 1775 (Female)
	10.Family:Philodromidae
35.	<i>Philodromus</i> sp. Walckenaer 1826 (Female)
	11.Family:Salticidae
36.	<i>Hasarius adansonii</i> Audouin 1826 (Female)
37.	<i>Hyllus semicupreus</i> Simon 1885 (Female)
38.	<i>Menemerus bivittatus</i> Dufour 1831 (Female)
39.	<i>Myrmarachne plataleoides</i> OP Cambridge 1869
40.	<i>Myrmarachne</i> Maratha Tikadar 1973 (Female)
41.	<i>Myrmarachne orientalis</i> Tikadar 1973 (Female)
42.	<i>Phintella vittata</i> C.L.Koch 1846 (Female)
43.	<i>Plexippus paykulli</i> Audouin 1826 (female)

Table 1: Contd.,	
44.	<i>Plexippus paykulli</i> Audoin 1826 (male)
45.	<i>Phiddipus</i> sp. (Female)
46.	<i>Rhene</i> sp. Thorell 1869 (Female)
47.	<i>Telamonia didimata</i> Simon 1889 (Female)
48.	<i>Thiania</i> sp. C.L.Koch 1847 (Female)
Family:Scytodidae	
49.	<i>Scytodes</i> sp. Walckenaer 1804 (Female)
Family:Sparassidae	
50.	<i>Olios</i> sp. Walckenaer 1837 (Female)
Family:Tetragnathidae	
51.	<i>Leucage decorata</i> Blackwall 1864 (Female)
Family:Theridiidae	
52.	<i>Argyrodes</i> sp.Simon,1864 (Female)
53.	<i>Argyrodes</i> sp.Simon,1864 (male)
54.	<i>Ariamnes</i> sp.Thorell 1869 (Female)
55.	<i>Ariamnes</i> sp.Thorell 1869 (male)
Family:Thomisidae	
56.	<i>Xysticus</i> sp.C.L.Koch 1835 (Female)
57.	<i>Thomisus</i> Sp.Walckenaer 1805 (Female)
Family:Uloboridae	
58.	<i>Uloborus</i> sp.Laterile 1806 (Female)

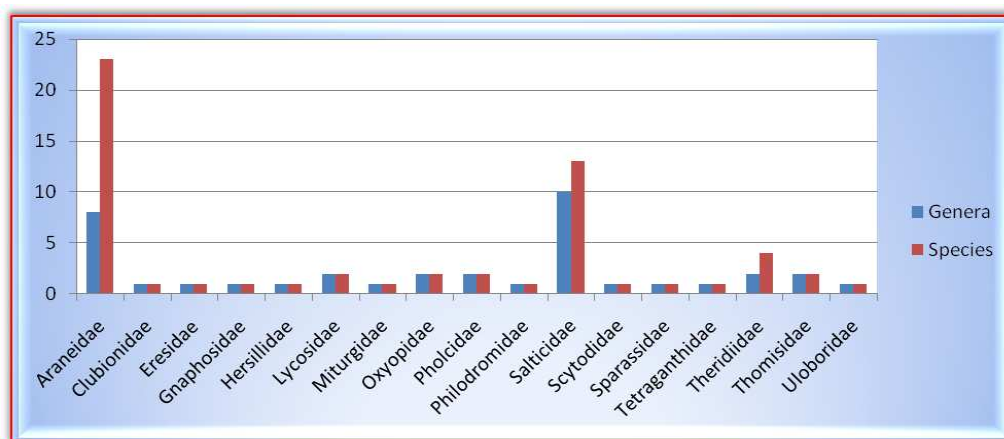


Figure 2: Family Wise number of Genera and Species

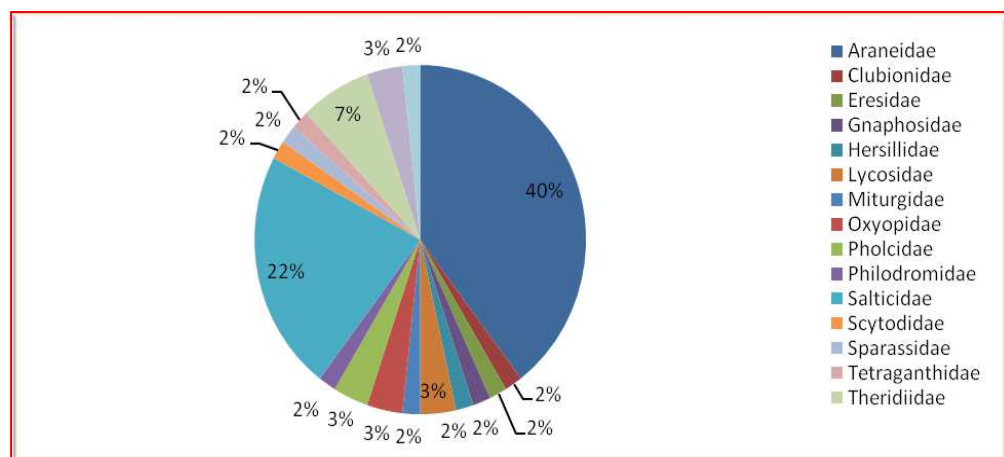


Figure 3: Percentile Distribution of Families of Spiders Around Sirpur Lake

Family Aranidae exploring 40% of spider species out of total spider species recorded from this area, followed by the family Salticidae exploring 22% and Theridiidae 7%. Family Lycosidae, Thomisidae, Pholcidae, Oxyopidae each exploring 3% of spider species. Remaining families Clubionidae, Eresidae, Gnaphosidae, Hersiliidae, Miturgidae, Philodromidae, Scytodidae, Sparassidae, Tetragnathidae, Uloboridae exploring 1% of spider species each.

The spiders live in different type of habitat spiders belonging to Salticidae, Eresidae, Thomisidae, Tetragnathidae, Oxyopidae, Theridiidae found in vegetation. Thomisidae spiders found on flowering plants. *Hersilia savignyi* (family Hersiliidae) was found on the bark of tree. Some spiders from Salticidae and Lycosidae family were located on the ground in between folded dry leaves. Orb webs are seen attached to the branches of plants and spiders rest in nearby shaded area. Also observed some ant mimicking spider from family Salticidae are *Myrmarachne plataleoides*, *Myrmarachne Maratha*, *Myrmarachne orientales*. Social spider *Stegodyphus sarasinorum* (Family Erisidae) also found in this area.

Spiders are found most abundantly from this area are *Argiope Aemula*, *Argiope anasuja*, *Cyclosa bifida*, *clubiona drassodes*, *Stegodyphus sarasinorum*, *Leucauge decorata*, *Hyllus semicupreus*, *Plexippus paykulli*, *Telamonia dimidiata*. Whereas spider species *Thiani* sp., *Rhene* sp. *Cyclosa spirifera* are found very rare in this area.

This study brought out the fact that though the sirpur lake is small water body near Indore city abode of spiders in addition to multitude of migratory birds. This rich diversity of spiders is also indicative of overall biodiversity of this area. Since the spiders are considered useful indicators of species richness. Abundance of Araneidae may be due to greater availability of prey due to better humidity and occurrence of high number of Salticidae is because it is cosmopolitan present everywhere in abundance. Spiders play the very important role to maintain ecological balance, if we conserve the spiders from this area it will definitely help to prey predator chain of this area.

REFERENCES

1. Coddington J. A. & Levi H. V. 1991: Systematics and Evolution of Spiders (Araneae) *Annu. Rev.Ecol. Syst.* 22: 565-592.
2. Coddington J. A., Young L. H., Coyle F.A. (1996) Estimating Spider Species Richness in a Southern Appalachian Cove Hardwood Forest. *J Arachnol* 24:111-128
3. Foelix, R. (1996). Biology of spiders. New York: Oxford University Press.
4. Gajbe, U. A. (1987). A new scorpoid spider from India (Araneae: Gnaphosidae). *Bulletin of the Zoological Survey of India* 8:285 -287
5. Gajbe, U. A. (1992 a). New record of Spider *Hersilia Savignyi* Lucas (Family : Hersiliidae) from Madhya Pradesh, India with a description.
6. Gajbe, U. A. (1995 a). Spiders, PP. 53 -56. In: (I) Fauna of conservation Areas 6: Fauna of Indravati Tiger Reserve, Madhya Pradesh. *Zoological Survey of India Publication*.
7. Gajbe, U. A. (1999). Studies on some spiders of the family Oxyopidae (Araneae : Arachnida) from India. *Records of the Zoological survey of India* 97(3):31-79.
8. Gajbe, U. A and P Gajbe (2000 c). A new species of spider of the genus *Neoscona* Simon (Araneae : Araneidae) from Madhya Pradesh India. *Records of the Zoological Survey of India* 98 (2): 119 – 121.

9. Gajbe, P. (2001). A faunistic survey of spiders (Arachnida) and their diversity in and around Jabalpur with special reference to their ecology. Ph.D. Thesis. Rani Durgavati University, Jabalpur, M.P. India.
10. Gajbe, P. (2003 b). A Checklist of spiders (Arachnida: Araneae) of Jabalpur, Madhya Pradesh, India. *Record of the Zoological survey of India* 101 (3-4): 43 – 47.
11. JOCQUE, R. & A. S. DIPPENAAR – SCHOEMAN 2006. Spider families of the world. Begijn, peters nv, Royal Museum for Central Africa.
12. Platnick, N. I. (1991). A revision of the ground spider family Cithaeronidae (Araneae, Gnaphosoidea). *American Museum Novitates* 3018: 1-13.
13. Platnick, N. I and U. A. Gajbe (1994). Supplementary notes on the ground spider family Cithaeronidae (Araneae, Gnaphosidae) *Journal of Arachnology* 22: 82 – 83.
14. Platnick, N. I. (2014) The World Spider Catalog, Version 14.5. American Museum of Natural History.
15. Rane P. D. and R. K. Singh (1977). Spiders (Arachnida : Araneida) from Kanha National Park, Madhya Pradesh, India. *Newsletter Zoological Survey of India* 3 (2): 84.
16. Tikader, B. K. and U. A. Gajbe (1976 a). New Spiders of Drasyllus from India (Gnaphosidae). *Oriental Insects* 10 (3): 431 – 434.
17. Tikader, B. K. and M. S. Malhotra (1980). Fauna of India, Spiders (Lycosidae) Vol.1, part 2. *Zoological survey of India*, 248 – 447 pp.
18. Tikader, B. K (1982 a) fauna of India spiders (Araneidae) Vol.2, part 1. *Zoological Survey of India*, 1 – 293 pp

